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INFLUENCE OF NUTRIENT SOURCES ON THE SEED YIELD AND QUALITY IN SNAKE GOURD (*TRICHOSANTHES ANGUINA* L*)*

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ABSTRACT

A field investigation was carried out in Kollam district, southern Kerala, India in randomized block design to study the influence of different sources of nutrients on the seed yield and quality in snake gourd (*Trichosanthes anguina* L*)* during 2011-12. Twelve combinations of different sources, organic and inorganic fertilizers were included as treatments. The results showed significant variations in the seed yields and highest yields (432.05 kgha^{-1}) were recorded in the treatments in which the recommended Kerala Agricultural University NPK dose was applied as organic manures followed by substitution of 25 per cent nitrogen with poultry manure (429.27kg ha^{-1}). Germination percentage, vigour index and 100 seed weights were significantly higher in the organically grown treatments receiving a combination of biofertilisers, vermicompost, poultry manure, neem cake and ash. Benefit cost analysis revealed significantly higher profits with organic nutrition bringing to light the feasibility of organic seed production in snake gourd.

KEYWORDS: Organic, Seed, Vermicompost

INTRODUCTION

Vegetable cultivation and production depends primarily on the availability of quality seeds. The health threats that are associated with the pesticide applied food have urged people to initiate farming on their own, especially vegetables. This requires technological inputs of which quality seed is the prime concern. The supply of good seeds in ample quantities has been a major challenge faced by the agricultural departments and Universities in different parts of the country. Snake gourd (*Trichosanthes anguina* L*)* is a popular vegetable crop in southern India grown principally for the immature fruits that can be cooked. The fruit is rich in minerals, calcium, phosphorus and vitamins, riboflavin, thiamin, niacin and carotene. Plant nutrition is one of the most important factors that increase production and balanced nutrition with macro and micro nutrients is regarded as an essential requirement for optimal plant growth and high quality products (Zeka *et al*, 2014). Sources of nutrients are reported to have a significant influence on seed yields (Rekha and Gopalakrishnan, 2001) and in this backdrop a research project on quality seed production on vegetables was undertaken with the objective of assessing the influence of different sources of nutrients on seed yield and quality and in snake gourd and the economics of the cultivation.

MATERIALS AND METHODS

The experiment was laid out during November 2011 to February 2012 in randomized block design with 12 treatments involving different combinations of sources of nutrients in three replications. The site selected for the study was in agro ecolological zone midland laterites (Kerala State Planning Board, 2013) enjoying a warm humid tropical climate. The soil belonging to the lateritic group was acidic (pH- 4.78), medium in available nitrogen (235.22 kg ha^{-1}) low in

phosphorus (20.16 kg ha^{-1}) and potassium 67.20 kg ha^{-1}). The variety Kaumadi of Kerala Agricultural University with long white fruits was used for the study. Nutrient doses were based on the recommendation dose (RD) of Kerala Agricultural University for seed crop of snake gourd, 87.5: 31.5: 31.5 kg NPK ha^{-1}. The treatments were T_1 - 100% RD as chemicals; T_2 -25% RDN as vermicompost ; T_3- 25 of RD N as poultry manure; T_4-25% RD N as vermicompost + poultry manure ; T_5-50% RD N as vermicompost; T_6- 50% RD N as poultry manure; T_7-50% N as vermicompost + poultry manure ; T_8-100% RDF as organic manures; T_9-50% RD N and K as foliar spray ; T_{10}-50% RD N and K as foliar spray; T_{11}- 150 % RD as chemical fertilizers; T_{12} - 150 % RD as organic manures. The chemical and organic manures used were urea (46 % N), rajphos (20% P_2O_5), potash (60% K_2O), vermicompost (0.42, 0.30 and 0.20% NPK) and poultry manure (1.40, 1.20 and 0.29% NPK). Neem cake, NP biofertilisers and ash were included in the fully organic treatments. The quantity of nutrient sources applied was based on nutrient contents in the different manures and were given singly or in combinations as per treatments in three splits: basal, one month after planting and after the first harvest. Full dose of phosphorus was applied basally. The first two harvests were done for vegetable purpose, the third to sixth harvest for seed extraction and the remaining for vegetable. Seeds were extracted from the ripe fruits, washed clean and dried to safe moisture levels and samples were subjected to germination and vigour tests. The observations on germination percentage, 100 seed weight and vigour index were recorded. The data on yield and yield attributes and seed characters were statistically analysed as per standard procedures (Gomez and Gomez, 1984) for significant variations among the treatments. The gross and net returns were worked out to compute the benefit cost ratios for comparison.

RESULTS AND DISCUSSIONS

The data on the growth and fruit yield of snake gourd as influenced by the different sources of nutrients are presented in Table1. The effect on the fruit yields and fruit length were non significant, although comparatively higher yields were recorded in the treatments receiving 100 percent recommended dose of nutrients as organic manures (7839.33 $kgha^{-1}$) followed by 25 percent RDN as poultry manure(7102.33 $kgha^{-1}$). The length of vine at final seed harvest, fruit weight and fruit girth varied significantly with the sources tried, the highest value for fruit girth was observed in T6, the treatment with 50 % RDN applied with poultry manure (28.60 cm) but on par with 25 % N as poultry manure (25.03 cm) and 100 per cent organic nutrition (25.70 cm).

Table 1: Influence of Nutrient Sources on Growth, Fruit Yield and Size in Snake Gourd

Treatments		Length of Vine (M)	Vegetable Yield ($Kgha^{-1}$)	Ripe Fruit Yield $Plant^{-1}$ ($Kgha^{-1}$)	Fruit Length (Cm)	Fruit Girth (Cm)	Weight of Single Fruit (G)
T1	100% RD as chemical fertlisers	10.70	2019.23	6300.07	73.57	22.70	1181.67
T2	25% RDN as VC	8.47	2020.33	4750.53	85.93	21.37	846.67
T3	25% RDN as PM	10.12	1653.48	7102.33	73.70	25.03	1420.00
T4	25% RDN as VC + PM	8.83	2218.33	5822.67	71.53	22.60	573.70
T5	50% RDN as VC	8.13	2335.67	7623.00	75.47	22.30	713.33
T6	50% RDN as PM	7.67	1523.50	5998.67	73.50	28.60	723.33
T7	50% RDN as VC + PM	8.40	1298.92	6871.33	70.23	22.10	540.00
T8	100 % RD as organic manures	9.77	2358.89	7839.33	86.93	25.70	677.33
T9	25% RD N and K foliar	8.87	1305.33	6317.67	77.40	21.20	275.39
T10	50% RDN and K foliar	8.67	1357.58	4730.00	52.90	18.03	561.67
T11	150% RD as chemical fertilisers	8.70	2108.33	5935.60	63.70	22.07	230.43
T12	150% RD as organic manures	10.27	1260.97	7663.33	91.23	23.40	1113.33
SE		0.76	-	-	-	2.43	204.39
CD		1.58	ns	ns	ns	5.03	423.90

The variations in seed yield and quality attributes (Table 2) were significant for number of seeds fruit^{-1}, seed yield and vigour index. Seed yields were maximum with organic nutrition (432.05 kgha^{-1}) on par with the substitution of 25 per cent RDN with poultry manure (429.27 kgha^{-1}. The higher values recorded for ripe fruit yield, single fruit weight and 100 seed weight account for the higher yields obtained in this treatment. It is assumed that the favourable nutritional environment in the root zone created by addition of organic manures would have resulted in increased absorption of these nutrients and uptake of these nutrients would be responsible for increased growth and yields. This has more significance in seed production as the crop has to be taken through an additional stage of maturity during which the slow nutrient release nature of organic manures is relevant. Gayathri and Reddy (2013) had also ascribed the higher yield responses of okra to organic manures to the improvement in physical and biological properties of the soil resulting in better supply of nutrients which lead to good crop growth and yields. In addition, the production of plant growth promoting substances like giberellin, cytokinin and auxins would also have a positive bearing on the crop growth and yields (Latha *et al*, 2013). The favourable effect on plant growth and yields with poultry manure application has been reported by by Mathew and Salikutty (2002) in gourds and Abou El-Magdn (2006) in broccoli. Lowest yields were recorded when 25 per cent RDN was supplied with a combination of poultry manure and vermicompost. It is observed that in plants given poultry manure and vermicompost to supply 25 per cent of RDN, the average weight of ripe fruit was low and number of seeds lowest despite better values for 100 seed weight which would have contributed to the lower seed yields.

Table 2: Seed Yield and Quality as Influenced by Nutrient Sources

Treatments		No. of Seeds Fruit^{-1}	Seed Yield (Kgha^{-1})	100 Seed Weight (G)	*Germination Percentage	Vigour Index
T1	100% RD as chemical fertlisers	94.0	340.46	28.50	94.27	1378.90
T2	25% RDN as VC	70.3	245.42	28.75	94.96	1236.63
T3	25% RDN as PM	94.3	429.27	30.24	94.96	1217.20
T4	25% RDN as VC + PM	55.3	185.36	29.05	93.23	1412.37
T5	50% RDN as VC	76.7	335.69	30.17	94.27	1424.27
T6	50% RDN as PM	74.7	251.73	29.40	94.96	1239.17
T7	50% RDN as VC + PM	78.3	278.93	27.63	100.00	1678.57
T8	100 % RD as organic manures	85.7	432.05	29.87	100.00	1692.30
T9	25% RD N and K foliar	97.3	376.10	27.53	94.96	1416.20
T10	50% RDN and K foliar	72.7	211.98	27.77	94.96	1430.07
T11	150% RD as chemical fertilisers	79.7	258.25	27.17	96.65	1357.60
T12	150% RD as organic manures	94.0	388.05	29.30	98.32	1591.13
SE		6.80	78.28	-	-	78.60
CD		14.1	162.35	ns	ns	163.01

*data were transformed (square root transformation) for statistical analysis

The positive influence of organic manures on seed quality is evident from the higher values recorded for 100 seed weight and vigour index for the organically grown plants. Seeds from the treatments with fifty per cent N substitution with a combination of vermicompost and poultry manure also showed high vigour index. The better performance in organic manures may be due to the accumulation of some enzyme or growth promoting substance in seeds in addition to proteins. The presence of growth promoting substances in vermicompost and poultry manure have been reported (Jose *et al*, 1988 ; Reddy and Reddy,2005).

ECONOMICS

The economics of seed production with the different sources of nutrients was worked out as the benefit cost ratio and it was proven that irrespective of the treatment, BC ratio were one or more (Figure 1), the maximum being with 25 per cent RDN as poultry manure (2.62) and 100 per cent RD as organic manures (2.57). The variations were significant with a no profit no loss observation in T_{10}, where 50 per cent RDN was given as foliar spray. The higher yields recorded would be responsible for the maximum profits, the slightly lower value in organic nutrition might be due to the differences in the cost of cultivation. It is also highlighted that the organic inputs in calculating the cost of cultivation were considered as purchased inputs and it is inferred that the benefits would be considerably higher if these are produced in situ in the farm as the cost would limit to the labour costs alone. The observations in this regard were reported by Channabasangowda *et al*.(2008) and Sheela *et al*. (2010)

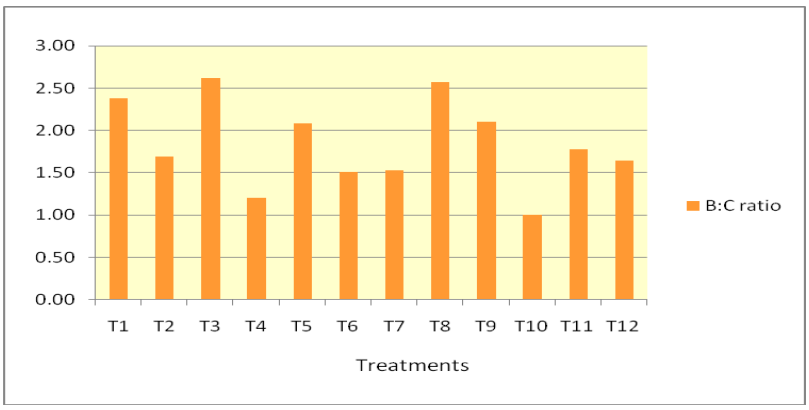

Figure 1: Benefit Cost Ratios of Snake Gourd Seed Production under Different Nutrient Sources (CD-0.48)

CONCLUSIONS

The study brings to light the positive response the seed crop of snake gourd has to organic nutrition. This is especially important in the present decade during which organic cultivation is being given utmost importance in crop production. Seeds produced organically are needed for organic certification. The yields and quality are on par with 25 per cent RDN substitution with poultry manure and hence can be recommended to farmers under integrated management. The recommendations would be more economic if the organic manures are produced *in situ*, in the farm itself.

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